

RF/RMRS-99-388, Rev. 0  
Effective Date: July 8, 1999

## **Task-Specific Health and Safety Plan for FY99 Well Abandonment and Replacement Program**

**DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
CLASSIFICATION OFFICE**

This Task-Specific Health and Safety Plan addresses the task specific hazards associated with FY99 Well Abandonment and Replacement Program  
Field activities will be conducted using this HASP for task and area specific hazards, and the  
RMRS Groundwater Monitoring Program Health and Safety Plan (RF/ER-SAF-94-GMP, Rev 1) for programmatic and general hazards



**ADMIN RECCRD**  
SW-A-003281

GROUNDWATER MONITORING PROGRAM SUBCONTRACTOR  
SPECIAL TASK HEALTH AND SAFETY PLAN  
Revision Level 0

1 Items 1-9 to be completed by RMRS Special Task Project Manager

Project Name FY99 Well Abandonment and Replacement Program

Task This Special Task Health and Safety Plan (HASP) covers activities to be conducted during the implementation of FY99 Well Abandonment and Replacement Program (WARP) well installations, which support three different Sampling and Analysis Plans (SAPs). These SAPs address drilling, probing, and well installations at 903 Pad/Ryan's Pit Plume (RF/RMRS-99-312), Actinide/ Solar Ponds Plume/East Industrial Area Plume (RF/RMRS-99-347), and D&D of Buildings 444, 771, and 886 (RF/RMRS-99-313). The activities proposed in these SAPs are designed to further delineate and characterize the extent of radiological and/or volatile organic compound (VOC) contamination for remedial activities in the respective areas. Proposed activities that will be covered by this HASP are limited to drilling or probing boreholes (using a hollow-stem auger drilling rig or Geoprobe®, respectively), sampling and/or containerizing surface and subsurface soils generated through the formation of these boreholes, and installing groundwater monitoring wells within these boreholes. Where the Geoprobe® is used to create boreholes, excess soils (termed investigation derived material, or IDM) are not anticipated to be generated. Instead, only soil core will be generated. Core will be boxed for geologic description and characterization. Where the drilling rig is used, both core (which will typically be boxed) and IDM will be generated, where this IDM requires further chemical and/or radiological characterization, samples for laboratory analysis will be collected. Where sufficient data exist for the area in which drilling is being conducted, the IDM will not be sampled. In either case, IDM will be placed in the appropriate 55-gallon drums. IDM sample analysis and interpretation for waste handling purposes will be the responsibility of RMRS. Once installed, sampling of the groundwater monitoring wells will be conducted under the Groundwater Monitoring Program HASP. Activities described in this Special Task HASP will be performed by or at the direction of RMRS Environmental Restoration Projects personnel.

Requested by John Boylan  
Proposed Start-Up Date July 12, 1999

Reviewed by RMRS Health and Safety Supervisor

Printed Name DAVID F. FARLEY  
Signature [Signature] Date 7/7/99

Reviewed and Approved by Radiological Engineer

Printed Name John C. Titus  
Signature [Signature] Date 7/7/99

Approved by RMRS Special Task Project Manager

Printed Name Steve Singer  
Signature [Signature] Date 7/7/99  
Title Technical Manager

Approved by RMRS Quality Assurance/Quality Control

Printed Name Greg DiGregorio  
Signature [Signature] Date 7-7-99  
Title Quality Assurance Manager

Note to Project Managers A signed and completed copy of the Health and Safety Plan and a signed and completed copy of the safety briefing must be included in the project file

APPROVAL DATE  
July 7, 1999

## 2 Project Description

**Description of Non-Intrusive Activities** There will be no non-intrusive activities other than setting up for intrusive activities

**Description of Planned Intrusive Activities** Intrusive activities will consist of drilling and probing boreholes, into which groundwater monitoring wells will be installed. Wells are proposed for several distinct areas as shown on Figure 1, including the hillside between the 903 Pad/Americium Zone (Am Zone) and the South Interceptor Ditch (SID), within the 903 Pad/Lip Soil Contamination Area (SCA), at the western extent of the new Solar Ponds Plume (SPP) treatment system, within the Industrial Area (IA) (the 600 Area, around Building 444 and Building 886, along 8<sup>th</sup> Ave from the 800 Area north to the Protected Area fence), and within the Protected Area (PA) (continuing along 8<sup>th</sup> Ave and its extension in the PA to Building 776, along Building 778, and around Building 771). The purposes of these activities are described in their respective SAPs and briefly in Item 4 below. The total number of wells will be between 35 and 40. Most will be 10 to 25 feet deep, though some will be deeper (to approximately 35 feet) and some may be shallower. Most will be installed as flush-mounts, but some will include casing that extends above the ground surface. Core from most or all boreholes will be collected, described, boxed, and archived for possible further study. Any excess soils will be containerized appropriately and sampled where necessary. Where sampling is required, composite soil samples will be collected and analyzed for some or all of the following: radionuclides, VOCs, metals, and a radiation screen. In at least four locations additional grab samples for radionuclide analysis will be collected: one from the surface and one from a depth of approximately 3 feet. Special well installation methods will also be used at these locations, two of which are in the 903 Pad/Lip SCA, one is on the hillside of the Am Zone, one is in the 600 Area, and four are towards the base of the Am Zone hillside along the SID. These methods have been used elsewhere on the RFETS to isolate boreholes from potentially contaminated surface soils, and will entail drilling a 16 to 20 inch diameter borehole to a depth of approximately 3 feet, installing casing in this borehole, and then proceeding to drill through the cased hole to total depth with smaller-diameter (typically 8 inch) tools. The well is then installed within the smaller-diameter borehole. All activities performed during all phases of the FY99 WARP will comply with approved SAPs and Standard Operating Procedures (SOPs).

## 3 Location

This Task Specific HASP covers planned drilling, probing, and well installation activities to be performed for characterization of 903 Pad/Ryan's Pit Plume groundwater, actinide (plutonium and americium in particular) migration in groundwater, groundwater at the western end of the new SPP treatment system, the East IA groundwater plume, and groundwater at three buildings scheduled for D&D (Buildings 444, 771, and 886). Field activities are scheduled for late spring through fall 1999. Figure 1 shows the various locations at which these activities will be taking place.

## 4 Facility/Worksite Description and Purpose of Activities

As shown in Figure 1, the work areas are mainly near or within the IA and PA. The following summaries briefly describe each area. More lengthy and detailed descriptions may be found in the respective SAPs.

The 903 Pad/Ryan's Pit Plume is an area of contaminated groundwater resulting from leaking drums once stored at the 903 Pad and from liquid wastes disposed in Ryan's Pit. In both cases, the fluid component was VOCs (solvents), some of which was contaminated with radionuclides. Remedial actions have taken place at both of these source areas, but the fluids have contaminated groundwater in both areas. Contaminated groundwater has coalesced into a mappable plume, part of which extends toward surface water features to the south (the SID and Woman Creek). VOCs have been detected in temporary wells installed on the hillside south of the 903 Pad/Am Zone and just north of the SID. Using a drilling rig, the proposed four wells will be installed in this area. Because there is a potential for surface soils contaminated with plutonium (Pu) and americium (Am) here, the special installation methods described above in Item 2 will be used on these four wells.

Several wells at RFETS have produced groundwater samples containing elevated levels of Pu and Am. The geochemistry of these radionuclides causes them to bind to soil particles, which restricts their movement in the subsurface. Therefore, groundwater is not expected to contain elevated levels of Pu and Am. Because these wells are in locations known to contain surface soils contaminated with these radionuclides, the possibility exists that the groundwater contamination is due to contaminated surface soils being driven down into the subsurface when these

wells were being installed Using a drilling rig, four proposed wells will be installed adjacent to four of these existing, Pu/Am-bearing wells, using methods designed to isolate surface soils from the deeper soils (as described above in Item 2) Concurrent sampling from the existing and new wells should then demonstrate whether the groundwater is in fact contaminated with elevated levels of Pu and Am The four wells are located as follows two on the flat area adjacent to the 903 Pad, one on the southern hillside of the Am Zone, and one adjacent to 7<sup>th</sup> Ave in the 600 Area of the IA

A treatment system is being installed to capture and treat groundwater contaminated with uranium and nitrates from the Solar Evaporation Ponds (SEPs) This contaminated groundwater forms a plume called the Solar Ponds Plume (SPP) In the valley at the western end of the treatment system, well coverage is poor To confirm that groundwater that bypasses the system around its western end is not contaminated to an extent that would require it to be captured by the system, up to three wells will be installed there using a drilling rig

Many wells across the central portion of the IA and PA are contaminated with VOCs This contamination is mapped as the Industrial Area VOC Plume, with an eastern boundary that approximately coincides with 8<sup>th</sup> Ave in the IA and its counterpart in the PA The plume shows an eastward bulge in the PA in the vicinity of Building 778 Many underground utilities are present along 8<sup>th</sup> Ave, presenting possible flowpaths for groundwater to discharge to surface water Using a Geoprobe®, fifteen wells will be installed along the flat-lying, industrialized 8<sup>th</sup> Ave and the eastward bulge at Building 778 to investigate areas of poor well coverage and to better delineate the IA Plume Underground utilities will be an important concern for this group of wells, as will overhead hazards and pedestrian and vehicle traffic

Three groups of wells will be installed around three buildings scheduled for D&D A group of 5 wells will be installed in the flat-lying ground surface around Building 444, which was used for manufacturing depleted uranium and beryllium components Four wells will be installed in the northward-sloping ground surface around Building 771, which was primarily used for production of plutonium components initially, then for chemical recovery of plutonium and americium Three wells will be installed in the flat-lying ground surface around Building 886, previously used for nuclear safety research and development All of these wells will be installed using a Geoprobe® Underground utilities will be an important concern for these three groups of wells, as will overhead hazards, pedestrian and vehicle traffic

## 5 Training Requirements/Proposed Personnel and Tasks

Minimum training required includes 40-hour OSHA Hazardous Waste Operations training (in accordance with 29 CFR 1910.120) and subsequent annual refresher(s) as necessary to be current, as well as several RFETS-required, RFETS-specific courses Which RFETS courses are required depends upon the individual responsibilities, as specified below

FY99 WARP TRAINING REQUIREMENTS	Program Manager	Project Manager	Field Supervisor	Rig Geologist	Health & Safety	HSA Rig Drillers	Geoprobe Operators	H&S Supervisor	COMMENTS
GERT (General Employee Radiological Training)	X		X*	X*	X*	X*	X*	X	Required for fieldwork (in non-rad areas)
Hazard Communication Work Area Indoctrination	X	X	X	X	X	X	X	X	Required
Hazard Communication	X	X	X	X	X	X	X		Required for field work
OSHA (40 hr)		X	X	X	X	X	X	X	Required for field work
OSHA (Supervisor)		X	X					X	
Hearing Conservation		X	X	X	X	X	X		Required for drilling/probing
Physical Examination		X	X	X	X	X	X		Required for field work
Pressure Safety			X	X	X	X	X		Required for heavy equipment decon
Radiological Worker II		X	X*	X*	X*	X*	X*		Required for field work in rad areas
RCRA Compliance									
Respirator Fit Test		X	X	X	X	X	X		Required for field work
Respirator Indoctrination		X	X	X	X	X	X		Required for field work
Unclassified Computer Security	X	X	X						

\*GERT is sufficient in non-rad areas, but personnel must be Radiological Worker II trained for activities in rad areas (Rad Worker II training meets GERT requirements, but GERT training does not meet Rad Worker II requirements)

Figure 2 shows the project organization chart and project responsibilities

**Figure 1**  
**FY99 WARP**  
**Location of Activities**

- EXPLANATION**
- Buildings around which wells will be installed
  - Line of Geoprobe Wells
  - Well Installation Area
- Standard Map Features**
- Buildings and other structures
  - Solar evaporation ponds
  - Lakes and ponds
  - Streams, ditches or other drainage features
  - Fences and other barriers
  - Paved roads
  - Dirt roads

NOTES:  
1. This map was prepared using aerial photography and other data from 1994 and 1995 and does not represent the current status of the site.  
2. This map was prepared by ERM Inc., Las Vegas.  
3. Digitized from the orthorectified data, 1:50,000.

Scale = 1" = 1170'  
1 inch represents approximately 764 feet

Graphic Scale: 0 100 200 feet

State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

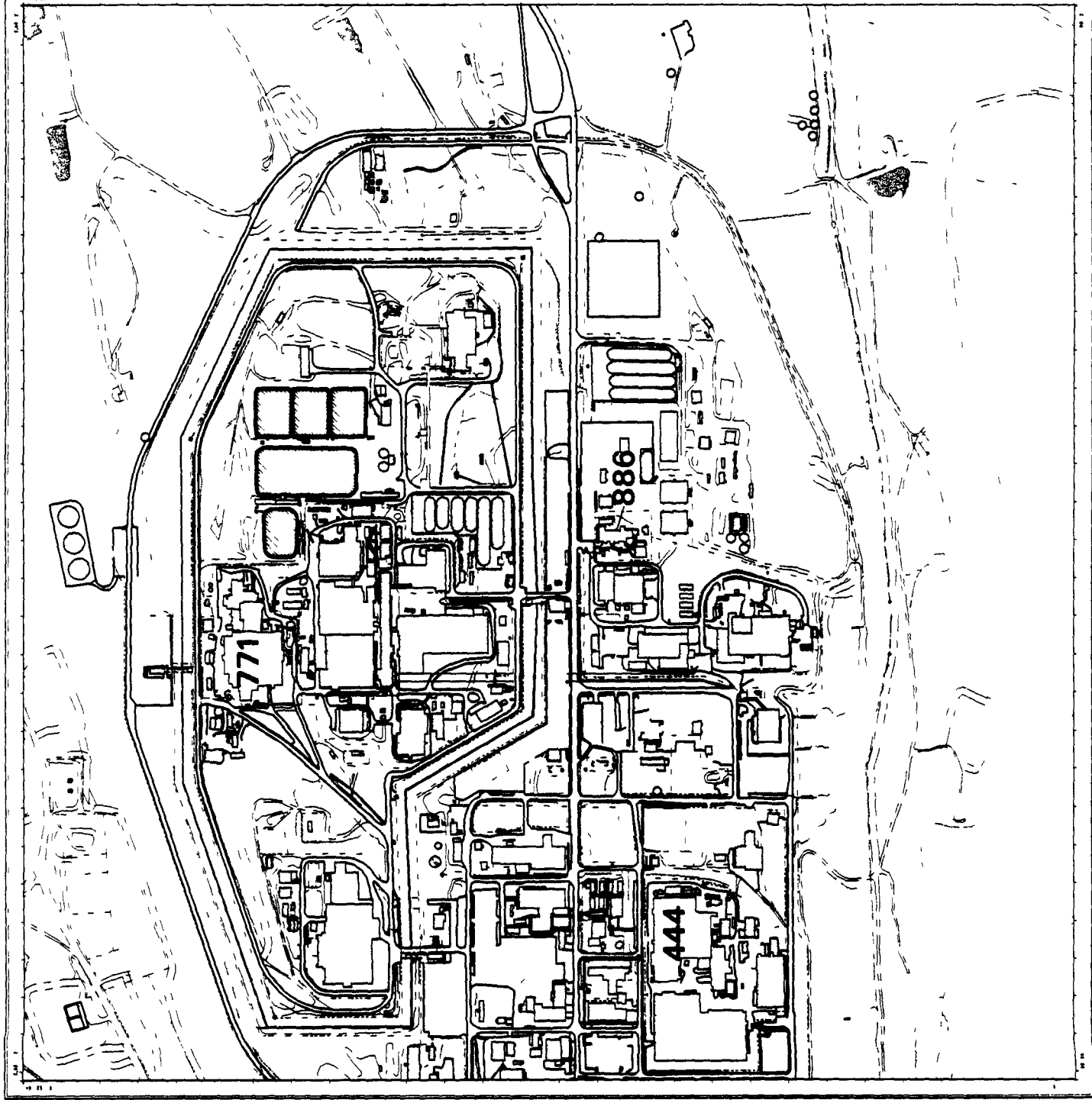
U.S. Department of Energy  
Rocky Flats Environmental Technology Site

**RMRS**  
Rocky Mountain  
Remediation Services, LLC  
2711 West  
12th Street  
Boulder, CO 80504

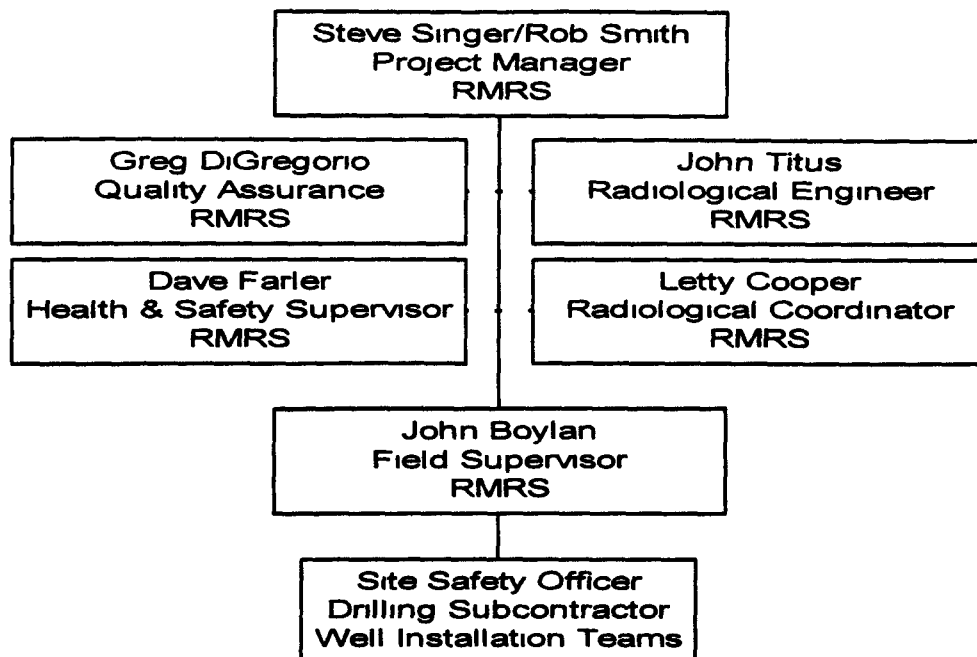
MAP ID: 98-0043

July 07, 1998

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**Figure 2**  
**FY99 WARP**  
**Organizational Chart**



<b>Proposed Task Leads</b>	<b>Job Function/Tasks</b>
Steve Singer/Rob Smith	RMRS Project Managers
Dave Farler	RMRS Health and Safety Supervisor responsible for implementation of HASP
John Titus	RMRS Radiological Engineer responsible for work conducted in accordance with ALARA Job Review, task-specific RWP's (as appropriate), property release evaluations, and Radiological Control Manual
Letty N Cooper	RMRS Radiological Coordinator, Radiological Operations foreman responsible for reviewing and signing surveys and RWP's, acts as point of contact for RCT support
Greg DiGregorio	RMRS Quality Assurance Engineer
John Boylan	RMRS Field Supervisor/Team Lead,
(or alternate)	Rig Geologist logging and sampling soils, supervising well installations
Harold Sanchez	Subcontractor Health and Safety Officer/Health and Safety Specialist responsible for implementation of the HASP
Tom Lutherer (or alternate)	Subcontractor Rig Geologist logging and sampling soils, supervising well installations, H&S Technician
Gary Stretesky (or alternate)	Subcontractor Geoprobe® Operator, H&S Technician
A Rodriguez/M Stevenson	Subcontractor Drill Rig Operator
(or alternate)	
J Cortez (or alternate)	Subcontractor Driller's Helper
<b>Designated Alternate Personnel</b>	<b>Function</b>
Paul Graham	Rig Geologist
Fred Grigsby	Rig Geologist
Gary Halbersleben	Rig Geologist, H&S Technician
Bob Koehler	Rig Geologist, Geoprobe® Operator, H&S Technician
Ray Michael	Geoprobe® Operator, H&S Technician
Harold Sanchez	Geoprobe® Operator
Subcontractor Personnel (to be determined)	Drill Rig Operator, Driller's Helper

## 6 Confined Space Entry

A confined space is defined as 1) large enough to enter, 2) limited access/egress, and 3) not intended for human occupancy (CFR 1910 146[b]). A permit required confined space also may pose additional hazards such as toxic contaminants, a flammable or oxygen deficient atmosphere, or other hazards, such as engulfment, or electrical or mechanical hazards should equipment be inadvertently activated while an employee is in the confined space. Confined spaces include but are not limited to storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, air pollution control devices, smoke stacks, underground utility vaults, sewers, septic tanks, and open top spaces more than four feet in depth such as test pits, waste disposal trenches, sumps and vats.

Will this task require entry into any confined or partially confined space?

☐ YES - Describe below  
☒ NO

## 7 Cutting and Welding

Will this task involve use of a cutting torch or welding?

☐ YES - Describe below  
☒ NO

## 8 Other Potential Hazards

☒ Chemical

☒ Radiological

☐ Fire/Explosion

☒ Heat/Cold Stress

☒ Electrical

☒ Machinery/Mechanical Equipment

☒ Slips, Trips, Falls

☐ Trenching/Shoring

☒ Heavy Equipment/Vehicular Traffic

☒ Overhead Hazards

☒ Unstable/Uneven Terrain

☒ Other - Describe below

## Description/Other

Hot and cold weather hazards (see Temperature Stress, Section 6.9 of Groundwater HASP).

Lightning/thunderstorms (see Thunderstorms and Tornadoes, Section 6.12 of Groundwater HASP).

Winds - wind warnings will be broadcast over RFETS radios and their instructions must be followed.

Drilling or probing in areas of abundant underground utilities.

Biological hazards (predominantly ticks, bees, wasps, spiders, and rattlesnakes).

Noise exposure and hazards - as defined in Activity Hazard Analysis (Appendix A), hearing protection will be worn whenever noise levels exceed 85dB using hand-held noise meter

9 I, John Boylan, attest that this information is accurate to the best of my knowledge and hereby request a Health and Safety Plan for the task(s) designated above

[Signature]  
Signature

Geologist  
Title

7/8/1999  
Date

## 10 Chemical/Radiological Hazard Evaluation

### Waste Media

☒ Airborne Contamination

☒ Surface Contamination

☒ Contaminated Soil

☒ Contaminated Surface Water

☒ Solid Waste

☒ Liquid Waste

☐ Sludge

### Hazardous Characteristics

☐ Ignitable

☐ Corrosive

☐ Reactive

☐ Explosive

☒ Toxic (non-radiological)

☒ Radioactive

## Substance Hazard Summary

This work involves potential contact with soil and water containing concentrations of chemicals in the parts per million range (milligrams per kilogram [mg/Kg] in soils, micrograms per liter [ $\mu\text{g/L}$ ] in water) and activities of radioisotopes in the picoCuries per gram or per liter range (pCi/g in soils, pCi/L in water). Data from the various investigation areas are

provided in Table 1, only detections above the most conservative Tier 2 action levels are listed. Analytes of potential concern that have been reported at below Tier 2 levels are listed in Appendix B. Because more data were available for groundwater than for soils, a conservative approach will be taken by assuming a species present in elevated concentrations in groundwater may also be present at elevated levels in soils. Particular attention will be paid to dust suppression and air monitoring activities at locations which could potentially produce contaminated soil. Personnel will use real-time air monitoring results to determine when and if it is necessary to upgrade to higher levels of PPE.

Particular attention will also be paid to any equipment or materials that may have the potential for leaking or spilling substances onto the ground (e.g., hydraulic systems, fuel tanks, etc.). These items will be scrutinized carefully and repeatedly throughout each day's activities. The drill rig and Geoprobe® will each be equipped with a spill kit in case leaks or other types of spills are detected. Spills will be described to the Project Manager or designee, and will be contained and handled in accordance with the instructions of the Project Manager.

Table 2 summarizes potential contamination hazards. Table 3 summarizes potential chemical hazards. Appendix A contains the task-specific Activity Hazard Analysis.

**Table 1**  
**Maximum Detected Contaminant Concentrations in Soil and Groundwater**  
**at FY99 WARP Locations**

Project or Area	Analyte	Surface Soil	Subsurface Soil	Groundwater
903 Pad/Ryan's Pit Plume	Cadmium	--	--	11 µg/L
	Carbon Tetrachloride	--	--	760 µg/L
	Methylene Chloride	--	--	31 µg/L
	Nitrate/Nitrite	--	--	9 mg/L
	Tetrachloroethene	--	--	23 µg/L
	Thallium	--	--	6 µg/L
	Trichloroethene	--	--	500 µg/L
	Tritium	--	--	2641 pCi/L
	Uranium-233,234	--	--	6 06125 pCi/L
	Uranium-238	--	--	4 1 pCi/L
Actinide wells (903 Pad/Lip, Am Zone)	Carbon Tetrachloride	--	330 µg/Kg	100,000 µg/L
	Chloroform	--	240 µg/Kg	49,000 µg/L
	Chloromethane	--	--	2,600 µg/L
	Methylene Chloride	--	66 µg/Kg	24,000 µg/L
	Tetrachloroethene	--	4,900 µg/Kg	20,000 µg/L
	Trichloroethene	--	--	4,600 µg/L
	1,1,1-Trichloroethane	--	--	46 µg/L
	1,1-Dichloroethane	--	--	150 µg/L
	1,3-Dichloropropene	--	--	8 1 µg/L
	1,1-Dichloroethene	--	--	26 µg/L
	Cis-1,2-Dichloroethene	--	3,500 µg/Kg	2900 µg/L
	Vinyl Chloride	--	--	34 µg/L
	Americium-241	3,140 pCi/g	31,670 pCi/g	46 54 pCi/L
	Plutonium-239/240	14,950 pCi/g	152,260 pCi/g	354 6 pCi/L
	Uranium-238	10 2 pCi/g	--	38 6 pCi/L
	Beryllium	12 mg/Kg	1 mg/Kg	--



**Table 1 (cont'd )**  
**Maximum Detected Contaminant Concentrations in Soil and Groundwater**  
**at FY99 WARP Locations**

Project or Area	Compound	Surface Soil	Subsurface Soil	Groundwater
Actinide well (Industrial Area)	Americium-241	--	--	0 26 pCi/L
	Antimony	--	--	18 µg/L
	Arsenic	--	5 mg/Kg	--
	Methylene Chloride	--	9 µg/Kg	--
	Plutonium-239/240	--	--	1 6 pCi/L
	Tetrachloroethene	--	--	8 4 µg/L
	Thallium	--	--	8 5 µg/L
	Tritium	--	--	2900 pCi/L
	Uranium-233,234	--	--	2 1 pCi/L
	Uranium-238	--	--	1 63 pCi/L
Solar Pond Plume	Antimony	--	--	117 µg/L
	Nickel	--	--	261 µg/L
	Selenium	--	--	1510 µg/L
	Thallium	--	--	7 2 µg/L
	Trichloroethene	--	--	6 µg/L
	Uranium-233,234	--	--	8 418 pCi/L
	Uranium-238	--	--	7 364 pCi/L
East IA Plume	1,1-Dichloroethene	--	--	98 µg/L
	Antimony	--	--	53 µg/L
	Barium	--	--	2640 µg/L
	Beryllium	--	--	29 3 µg/L
	Bis(2-ethylhexyl)phthalate	--	--	15 µg/L
	Carbon Tetrachloride	--	--	69 µg/L
	Chromium	--	--	399 µg/L
	Cis-1,2-Dichloroethene	--	--	210 µg/L
	Methylene Chloride	--	--	240 µg/L
	Radium-226	--	--	22 pCi/L
	Radium-228	--	--	28 pCi/L
	Strontium-89,90	--	--	3 8 pCi/L
	Tetrachloroethene	--	--	1600 µg/L
	Thallium	--	--	8 9 µg/L
	Trichloroethene	--	--	4200 µg/L
	Tritium	--	--	2973 pCi/L
	Uranium-233,234	--	--	84 pCi/L
	Uranium-235	--	--	2 3 pCi/L
	Uranium-238	--	--	30 29 pCi/L
	Vanadium	--	--	855 µg/L
Building 886	Sulfate	--	--	1000 mg/L
	Thallium	--	--	7 8 µg/L
	Uranium-233,234	--	--	49 pCi/L
	Uranium-235	--	--	1 61 pCi/L
	Uranium-238	--	--	37 2 pCi/L

**Table 1 (cont'd)**  
**Maximum Detected Contaminant Concentrations in Soil and Groundwater**  
**at FY99 WARP Locations**

Project or Area	Compound	Surface Soil	Subsurface Soil	Groundwater
Building 444	Beryllium	--	--	5.4 µg/L
	Bis(2-ethylhexyl)phthalate	--	--	110 µg/L
	Cis-1,3-Dichloropropene	--	--	7.1 µg/L
	Methylene Chloride	--	--	20 µg/L
	Nitrate/Nitrite	--	--	2550 µg/L
	Strontium-89,90	--	--	1,388 pCi/L
	Tetrachloroethene	--	--	67 µg/L
	Thallium	--	--	7.2 µg/L
	Trichloroethene	--	--	15 µg/L
	Uranium-233,234	--	--	3.6 pCi/L
	Uranium-238	--	--	7.4 pCi/L
	Vinyl Chloride	--	--	12 µg/L
Building 771	1,1-Dichloroethene	--	--	94 µg/L
	Antimony	--	--	29.6 µg/L
	Benzene	--	--	63 µg/L
	Beryllium	--	7.9 mg/Kg	--
	Carbon Tetrachloride	--	--	1300 µg/L
	Cesium-137	--	--	1.8 pCi/L
	Chloroform	--	--	170 µg/L
	Methylene Chloride	--	--	11 µg/L
	Nitrate/Nitrite	--	--	5620 µg/L
	Thallium	--	--	11.6 µg/L
	Trichloroethene	--	--	61 µg/L
	Tritium	--	--	990 pCi/L
	Uranium-233,234	--	--	11 pCi/L
	Uranium-238	--	--	6.9 pCi/L

-- Indicates data were not available or analyte was below Tier 2 levels

**Table 2**  
**Potential Contamination Hazards**

Task Description	Potential Contaminants	PPE to be Used
Drilling or probing boreholes, disturbing surface and subsurface soils, handling soils, and installing groundwater monitoring wells	Soil and saturated soil with low to high levels of volatile organic compounds and radionuclides	Start in modified Level D or per Radiological Work Permit (RWP) requirements. Air monitoring and/or soil conditions (wet, muddy) may indicate need to upgrade to Level C or B at the discretion of the Health and Safety Specialist (HSS). Engineering controls (pausing to allow air levels to drop, reorienting activities with respect to wind direction, etc.) will be used before upgrading to higher level of protection, if appropriate.
Groundwater sampling	Groundwater with low to high levels of volatile organic compounds and low to moderate levels of radionuclides	Start in modified Level D or per RWP requirements. Air monitoring and/or soil conditions (wet, muddy) may indicate need to upgrade to Level C or B at the discretion of the HSS. Engineering controls (pausing to allow air levels to drop, reorienting activities with respect to wind direction, etc.) will be used before upgrading to higher level of protection, if appropriate.

Table 3

# CHEMICAL HAZARD SUMMARY

Compound, page*	Physical Description	Exposure Path	Corrosive/Irritant	Flammable	Explosive	Reactive	Exposure Limit	IDLH Level	Health Effect
1,1,1-Trichloroethane, 202	Colorless liquid with a mild, chloroform-like odor	Inhalation, ingestion, contact w/eyes or skin	no	UNK	yes	no	350 ppm	700 ppm	Irritates eyes, skin, headache lassitude central nervous system depression poor equilibrium, dermatitis, cardiac arrhythmia liver damage
1,1-Dichloroethane 98	Colorless, oily liquid with a chloroform-like odor	Inhalation, ingestion, contact w/eyes or skin	no	yes	yes	no	100 ppm	3000 ppm	Irritates skin, central nervous system depression, liver, kidney, lung damage
1,1-Dichloroethene, 332	Colorless liquid (or gas above 89F) with a mild, sweet, chloroform-like odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	yes	yes	no	1 ppm (OSHA, now vacated)	ND	Irritates eyes, skin, throat, dizziness headache, nausea breathing difficulty liver kidney dysfunction pneumonia potential occupational carcinogen
1,3-Dichloropropene, 100	Colorless to straw-colored liquid with a sharp, sweet, irritating, chloroform-like odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	yes	yes	no	1 ppm (skin)	ND	Irritates eyes skin respiratory system eye skin burns, watery eyes headache, dizziness, in animals liver kidney damage potential occupational carcinogen
Americium-241 (Am-241)**	Silvery, somewhat malleable radioactive metal	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	5 rem/yr 2x10 <sup>-12</sup> uCi/ml derived air concentration (DAC)	ND	No acute symptoms from low-level exposures, potential occupational carcinogen
Antimony (compounds as Sb), 18	Silver-white, lustrous, hard, brittle metal, scale-like crystals, dark-gray lustrous powder	Inhalation, ingestion, contact w/eyes or skin	no	no	no	no	0.5 mg/m <sup>3</sup>	50 mg/m <sup>3</sup>	Irritates eyes skin, nose throat mouth cough, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps insomnia, anorexia unable to smell properly
Arsenic (inorganic compounds, as As), 20	Silver-gray to tin-white metal, brittle, odorless	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	0.002 mg/m <sup>3</sup>	5.0 mg/m <sup>3</sup>	Ulceration of nasal septum, dermatitis, peripheral neuropathy gastrointestinal disturbance respiratory irritation hyperpigmentation of skin potential occupational carcinogen
Benzene, 26	Colorless to light yellow liquid with an aromatic odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	yes	UNK	no	0.1 ppm	500 ppm	Irritates eyes skin, nose respiratory system, giddiness headache nausea, staggered gait, fatigue lassitude anorexia dermatitis bone marrow depression, potential occupational carcinogen
Beryllium (beryllium compounds as Be), 28	Gray-white metal, hard, brittle	Inhalation, contact w/eyes or skin	no	no	no	no	0.0005 mg/m <sup>3</sup>	4.0 mg/m <sup>3</sup>	Berylliosis anorexia weight loss weakness chest pain, cough clubbing of fingers cyanosis pulmonary insufficiency eye irritation, dermatitis potential occupational carcinogen

Compound, page*	Physical Description	Exposure Path	Corrosive/ Irritant	Flammable	Explosive	Reactive	Exposure Limit	IDLH Level	Health Effect
Bis(2-ethylhexyl)phthalate, 118	Colorless, oily liquid with a slight odor	Inhalation, ingestion, contact w/eyes or skin	no	no	yes	no	5 mg/ m <sup>3</sup>	5000 mg/ m <sup>3</sup>	Irritates eyes, mucous membranes in animals, causes liver damage teratogenic effects potential occupational carcinogen
Cadmium (as Cd dust), 44	Silver-white, bluish-tinged lustrous odorless metal	Inhalation, ingestion	no	no	no	no	0.005 mg/m <sup>3</sup>	9.0 mg/m <sup>3</sup>	Pulmonary edema, difficulty breathing cough tight chest substernal pain, headache, chills, muscle aches nausea vomiting, diarrhea, anoxia, emphysema proteinuria, mild anemia, potential occupational carcinogen
Carbon Tetrachloride, 54	Colorless liquid with an ether-like odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	2 ppm (skin)	200 ppm	Irritates eyes depresses central nervous system, nausea vomiting, liver kidney injury, drowsiness dizziness incoordination, potential occupational carcinogen
Chloroform, 64	Colorless liquid with a pleasant odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	2 ppm	500 ppm	Irritates eyes, skin, dizziness mental dullness, nausea confusion headache fatigue, anesthesia, enlarged liver potential occupational carcinogen
Chloromethane 202	Colorless gas with faint, sweet odor which is not noticeable at dangerous concentrations	Inhalation	no	yes	yes	no	100 ppm (OSHA)	2000 ppm	Dizziness nausea, vomiting visual disturbance staggering slurred speech convulsion coma liver kidney damage reproductive teratogenic effects potential occupational carcinogen
1,2-Dichloroethene (reported as cis-1,2-dichloroethene) 98	Colorless liquid (usually a mixture of cis- and trans- isomers) with a slightly acrid, chloroform-like odor	Inhalation, ingestion, contact w/eyes or skin	no	yes	yes	no	200 ppm	1000 ppm	Irritates eyes respiratory system, central nervous system depression
1,3-Dichloropropene (reported as both cis- and trans-1,3-dichloropropene), 100	Colorless to straw-colored liquid with a sharp, sweet, irritating, chloroform-like odor (exists as mixture of cis- and trans- isomers)	Inhalation, absorption, ingestion, contact w/eyes or skin	no	yes	yes	no	1 ppm	ND	Irritates eyes, skin respiratory system eye skin burns watering eyes, headache dizziness in animals, liver and kidney damage, potential occupational carcinogen
Methylene Chloride, 208	Colorless liquid with a chloroform-like odor (a gas above 104F)	Inhalation, absorption, ingestion, contact w/eyes or skin	no	UNK	no	no	25 ppm (OSHA)	2300 ppm	Irritates eyes, skin fatigue, weak sleepiness light-headed, numbness tingling, nausea, potential occupational carcinogen
Nickel (as metal and other compounds as Ni), 224	Silvery, lustrous metal	Inhalation, ingestion, contact w/eyes or skin	no	no	no	no	0.015 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	Sensitization dermatitis allergic asthma pneumitis potential occupational carcinogen
Plutonium-239/240 (Pu-239/240)**	Silvery, radioactive metal	Inhalation, absorption, contact w/eyes or skin	no	no	no	no	5 rem/yr, 2x10 <sup>-12</sup> uCi/ml derived air concentration (DAC)	ND	No acute symptoms from low-level exposures potential occupational carcinogen

Compound, page*	Physical Description	Exposure Path	Corrosive/Irritant	Flammable	Explosive	Reactive	Exposure Limit	IDLH Level	Health Effect
Selenium (as Se), 276	Red to gray amorphous or crystalline solid	Inhalation, ingestion, contact w/eyes or skin	no	no	no	no	0.2 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	Irritates eyes skin nose throat visual disturbance headache chills, fever, breathing difficulty bronchitis, metallic taste garlic breath gastrointestinal disturbance, dermatitis eye, skin burns potential human carcinogen
Tetrachloroethene, 300	Colorless liquid with a mild, chloroform odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	25 ppm	150 ppm	Irritates eyes, nose throat, nausea flushed face neck dizziness, vertigo incoordination, headache, sleepiness skin redness liver damage, potential occupational carcinogen
Thallium (soluble compounds, as Tl), 304	Appearance and odor vary depending on the specific compound	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	0.1 mg/m <sup>3</sup>	15 mg/m <sup>3</sup>	Nausea diarrhea, abdominal pain vomiting, ptosis strabismus, peripheral neuritis tremors, retrosternal tightness, chest pain pulmonary edema seizures chorea, psychosis, liver kidney damage alopecia paresthesia legs
Trichloroethene, 316	Colorless liquid with a chloroform-like odor	Inhalation, absorption, ingestion, contact w/eyes or skin	no	UNK	yes	no	25 ppm	1000 ppm	Irritates eyes, skin, headache vertigo, visual disturbance fatigue, giddiness tremors, sleepiness, nausea vomiting dermatitis, cardiac arrhythmia, paresthesia liver injury, potential occupational carcinogen
Uranium isotopes (U-233/234, U-235, U-238)**	Silvery radioactive metal	Inhalation, absorption, ingestion, contact w/eyes or skin	no	no	no	no	5 rem/yr, 2x10 <sup>-11</sup> uCi/ml derived air concentration (DAC), 0.05 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	No acute symptoms from low-level exposures potential occupational carcinogen
Vinyl Chloride, 330	Colorless gas with a pleasant odor at high concentrations	Inhalation	no	yes	yes	no	1 ppm (OSHA)	ND	Weakness abdominal pain, gastrointestinal bleeding, enlarged liver pallor or cyan of extremities potential occupational carcinogen

Data from NIOSH Pocket Guide to Chemical Hazards, June 1997, except \*\* (see below)

\* Page number listed refers to that on which compound may be located in NIOSH Pocket Guide to Chemical Hazards, June 1997, in which several of the above compounds are listed by synonym

\*\* Data from Site Specific HASP, Source Removal at Trench T-1, IHSS 108 (RF/RMRS-97-010)

Exposure limits are the most conservative values listed in the NIOSH Guide. That is, in cases where the Guide lists a NIOSH value and an OSHA value, the lowest value is listed above. ND = No data. UNK = listed as unknown in NIOSH Pocket Guide to Chemical Hazards June 1997

Flammability based on flash point if lower than 150°F, listed as flammable Explosive based on LEL if between 0-10% listed as explosive (These boundaries reflect expected working conditions) Where NIOSH data are ambiguous, most conservative position is taken. For example, a species that is nonflammable according to above definition but LEL is listed as 0.3% at >150°F would be listed as not flammable but explosive, a species with a flash point listed as NA but which is defined in NIOSH as a flammable gas would be listed above as flammable

### 11 Ambient Air/Site Monitoring Procedures

The following instruments shall be used to monitor the work environment and workers' breathing zones prior to site entry, during intrusive activities, and during core/soil handling

Instrument	Monitoring Frequency				
<input checked="" type="checkbox"/> PID w/11 7 eV lamp	Cont	15 min	30 min	hourly	other <input checked="" type="checkbox"/>
<input type="checkbox"/> OVA	Cont	15 min	30 min	hourly	other <input type="checkbox"/>
<input type="checkbox"/> Combustible Gas Indicator	Cont	15 min	30 min	hourly	other <input type="checkbox"/>
<input type="checkbox"/> H <sub>2</sub> S Detector	Cont	15 min	30 min	hourly	other <input type="checkbox"/>
<input type="checkbox"/> Colorimetric Detector Tubes	Cont	15 min	30 min	hourly	other <input type="checkbox"/>
<input checked="" type="checkbox"/> Other (describe below)	Cont	15 min	30 min	hourly	other <input checked="" type="checkbox"/>

#### Description/other

TVA 1000B, Toxic Vapor Analyzer (PID/FID) may be used instead of or in addition to the listed PID Monitor personnel breathing zones and soil surfaces during times of potential exposure at the discretion of the HSS or Health and Safety (H&S) Technician Monitor dust with Mini-RAM dust monitor at the discretion of the HSS or H&S Technician A Bicon Field Instrument for the Detection of Low-Energy Radiation (FIDLER) will be used to quantify surface soil radiation levels, and a NE Electra instrument will be used to scan the core retrieved in areas where radionuclides are a concern (903 Pad/Lip, Am Zone, and as required around buildings and in the IA and PA)

### 12 Action Levels

Task personnel will observe the following Action Levels

**Table 4**  
**Field Monitoring Equipment - Action Levels**

Instrument	Action Level	Specific Action
PID/FID	Any sustained reading above background in the breathing zone	If any sustained reading above background is present in the breathing zone, affected personnel will move away from the borehole, preferably in an upwind direction, for a time period determined by the HSS or H&S Technician Most likely, the VOC levels will dissipate, as confirmed by the HSS or H&S Technician, and personnel may return to the work area. If readings above background do not dissipate, a large fan will be used to disperse the VOCs from the breathing zone If the fan does not reduce VOC readings to background levels, work will be stopped and the RMRS Health & Safety and the task-specific Project Manager will be contacted (Note if conducting activities in an area characterized by surface soils with elevated levels of radionuclides, a fan may not be allowed due to its potential to mobilize contaminated dusts The HSS and/or RCT, as appropriate, will coordinate with the Project Manager to determine the proper course of action in such cases)
Mini-RAM dust monitor	1.5 mg/m <sup>3</sup> sustained dust levels obtained in the breathing zone	If sustained levels equal to or greater than 1.5 mg/m <sup>3</sup> are obtained in the breathing zone, dust suppression and soil wetting techniques will be employed using a small sprayer or other equivalent means
In Rad Areas NE Electra, high-volume air sampler, Ludlum 2929		Action Levels and Specific Actions to be determined by Rad Ops (Possible action is if activity equal to or greater than 1 DAC [or limit stated on RWP, if required] is observed, pause work and evaluate for radon If not radon, suspend work, contact Rad Engineer and evaluate controls and PPE)

### 13 Personal Monitoring

☒ Passive Dosimeter ☐ Personal Air Sampling ☐ Other

#### Description/Other

### 14 Biological Monitoring/Medical Surveillance

This project requires medical surveillance/bioassay monitoring per 29 CFR 1910.120 and as described in Section 6.1 of the Groundwater Monitoring Program HASP

### 15 Onsite Control

Control boundaries will be established at each drilling or probing location when setting up to begin drilling or probing. Boundaries will remain until well installation activities at that location have been concluded. Control boundaries will be configured at the discretion of and erected by the HSS or, at Geoprobe® locations, the H&S Technician. In general, it will include an Exclusion Zone (EZ) surrounding the intrusive activities – the potentially contaminated area, a Contamination Reduction Zone (CRZ) in which decontamination, core description, and record-keeping/documentation will be performed, and a Support Zone (SZ) – clean area – where support vehicles and extra supplies will be located. In radiological areas, these three zones will typically be distinct, with a clearly delineated EZ (or radiological area), which will be accessed through the CRZ (or radiological buffer area), outside of which is the unmarked SZ. In non-radiological areas, the EZ and CRZ may be combined within the exclusionary markers, with the SZ outside these markers. Exclusionary markers will consist of standard yellow "Caution" tape attached to stanchions and/or a ring of standard fluorescent orange traffic cones, and will be erected at least 10 feet from the borehole (significantly more at drilling rig locations due to the larger size of the rig). Signage will be attached to exclusionary markers describing the appropriate requirements (e.g., Hard Hats, Hearing Protection, Eye Protection, etc.). For further description of the zones, refer to section 6.5 of the GMP HASP.

The HSS or H&S Technician will coordinate access control to the individual work sites during the implementation of the separate site characterization tasks. No unauthorized person shall be allowed beyond the Support Zone.

An RCT/HSS will be assigned to perform radiological surveys and contamination monitoring in accordance with RFETS procedures and the RWP (where applicable) for the different site characterization tasks.

### 16 Personal Protective Equipment

<u>Location</u>	<u>Job Function/Task</u>	<u>Initial Level of Protection</u>
903 Pad/Lip Area	Drilling, handling soils, and installing wells, decontaminating equipment in the field	
Exclusion Zone (Contamination Area or High Contamination Area)	<u>Mod Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
Contamination Reduction Zone (Radiological Buffer Area)	<u>Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
<u>Location</u>	<u>Job Function/Task</u>	<u>Initial level of Protection</u>
Americium Zone	Drilling, handling soils, and installing wells, decontaminating equipment in the field	
Exclusion Zone (Contamination Area or High Contamination Area)	<u>Mod Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
Contamination Reduction Zone (Radiological Buffer Area)	<u>Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
<u>Location</u>	<u>Job Function/Task</u>	<u>Initial level of Protection</u>
903 Pad/Ryan's Pit Plume	Drilling, handling soils, and installing wells, decontaminating equipment in the field	
Exclusion Zone (Contamination Area or High Contamination Area)	<u>Mod Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
Contamination Reduction Zone (Radiological Buffer Area)	<u>Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER

<u>Location</u>	<u>Job Function/Task</u>	<u>Initial level of Protection</u>
Solar Ponds Plume area	Drilling, handling soils, and installing wells, decontaminating equipment in the field	
Exclusion Zone (Contamination Area or High Contamination Area)	<u>Mod Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
Contamination Reduction Zone (Radiological Buffer Area)	<u>Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER

<u>Location</u>	<u>Job Function/Task</u>	<u>Initial level of Protection</u>
Industrial Area Plume area (including misc PA locations)	Drilling, handling soils, and installing wells, decontaminating equipment in the field	
Exclusion Zone (Contamination Area or High Contamination Area)	<u>Mod Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
Contamination Reduction Zone (Radiological Buffer Area)	<u>Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER

<u>Location</u>	<u>Job Function/Task</u>	<u>Initial level of Protection</u>
Buildings 444, 771, 886	Drilling, handling soils, and installing wells, decontaminating equipment in the field	
Exclusion Zone (Contamination Area or High Contamination Area)	<u>Mod Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER
Contamination Reduction Zone (Radiological Buffer Area)	<u>Level D protection unless the RWP has more stringent requirements</u>	B C <u>D</u> OTHER

List the specific protective equipment and material (where applicable) for each of the levels of protection identified above

Level B (also includes all Mod Level D requirements)  
 \_\_\_\_\_ Pressure demand airline with escape provisions  
 \_\_\_\_\_ Pressure demand SCBA

Level C (also includes all Mod Level D requirements)  
 \_\_\_\_\_ Half face air purifying respirator  
 \_\_\_\_\_ Full face air purifying respirator  
 \_\_\_\_\_ Full face canister air purifying respirator  
 \_\_\_\_\_ Outer NBR gloves

Level Modified D

☒ Standard work clothes/ DOE coveralls  
☒ Hard hat, hard-toed boots, safety glasses  
☒ Ear protection during drill rig hammering operation  
☒ Inner nitrile gloves (2 pair)  
☒ Outer Nitrile Butyl Rubber (NBR) gloves (if required by RWP)  
☒ Outer Nitrile Butyl Rubber (NBR) booties (if required by RWP)  
☒ Tyvek coveralls, taped at wrists and ankles (if required by RWP)

Level D

☒ Standard work clothes/DOE coveralls  
☒ Hard hat, hard-toed boots, safety glasses  
☒ Ear protection during drilling or hammering  
☒ Inner nitrile gloves (1 pair)

**NOTES** Hard hat will be worn when within 5 feet of Geoprobe® operation or 50 feet of hollow-stem auger operation, or if overhead hazards are present Orange traffic vests are required when moving drill rig or Geoprobe® and when operating in areas of vehicular traffic Long-sleeve DOE coveralls are required for some activities, the HSS will instruct field crews as to the specific activities to which this applies



As indicated previously, air monitoring will be conducted for dust and organic constituents, and additional monitoring will be conducted for radioactive constituents. Positive detections of contaminants that cannot be controlled through dust suppression methods or by pausing to allow VOCs to vent will require the field crew to pause while the HSS consults with the RMRS Health and Safety Supervisor. If air purifying respirators or other respiratory protection are found to be necessary, either at the instruction of the RMRS Health and Safety Supervisor or due to RWP requirements, personnel will use only the cartridge type(s) specified by the Radiological Operations and Industrial Hygiene departments, as communicated by the RMRS Health and Safety Supervisor. Under no circumstances will an unapproved cartridge type be used in place of the cartridge selected by these departments. Cartridges will be replaced at the start of each work day.

NO CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE KNOWLEDGE AND APPROVAL OF THE HEALTH AND SAFETY OFFICER AND THE PROJECT MANAGER

#### 17 Decontamination

In order to leave the EZ, equipment (and, if necessary, personnel) will proceed through decontamination procedures, as appropriate, in the CRZ. Decontamination procedures will comply with current RFETS Standard Operating Procedures. In addition, decontamination in radiological areas will be conducted in accordance with Section 6.5.2.1 of the GMP HASP, Radiological Areas - Step-off Pad Requirements and the task-specific RWP.

#### Emergency decontamination procedures

Decontamination of equipment will typically not be a requirement during an emergency; instead, equipment may be left as-is, where-is unless personnel are directed otherwise by the Project Manager or designee. In the event of personnel injury where contamination of the injured individual(s) is suspected, decontamination of the individual(s) will be performed to prevent further exposure to contaminants ONLY if such actions will not further aggravate the injury or cause unwarranted delay. The HSS will decide whether to decontaminate the injured individual(s) based upon the nature and extent of injury. The HSS will, in as timely a manner as feasible, consult with and inform the RMRS Health and Safety Supervisor, Project Manager, and any other individuals as appropriate.

#### 18 Confined Entry Procedures X Not Applicable

Yes	N/A		Yes	N/A	
___	___	Provide Forced Ventilation	___	___	Refer to Personal Protection Equip (#16)
___	___	Test Atmosphere for	___	___	Refer to Emergency Procedures (#29)
___	___	(a) %O <sub>2</sub>	___	___	Other Special Procedures
___	___	(b) %LEL			
___	___	(c) Other			
Descriptions/Other					

#### 19 Cutting/Welding X Not Applicable

Yes	N/A	
___	___	Relocate or protect combustibles
___	___	Wet down or cover combustible floor
___	___	Check flammable gas concentrations (%LEL) in air
___	___	Cover wall, floor, duct and tank openings
___	___	Provide fire extinguisher
Other Special Instructions		

## 20 Special Instructions

### Unanticipated Hazards or Conditions

Any hazards that may be encountered which are of an unusual nature or which represent an unknown threat will be managed in accordance with the following RMRS policy statement

“In the event unanticipated hazards or conditions are encountered, the project activities will pause to assess the potential hazard or condition. The potential hazard or condition will be evaluated to determine the severity or significance of the hazard or condition and whether the controls on the project are sufficient to address the hazard or condition. Based on this initial evaluation, a determination will be made whether to proceed with controls currently in place, segregate the hazard or condition from the project activity, if it can be done safely, or curtail operations to address the unexpected hazard or condition. Concurrence to proceed down the selected path must be obtained from the RMRS Vice President or their designee. In addition, the resumption of field activities involving radiological issues will be in accordance with Article 345 of the RFETS Radiological Control Manual”

## 21 Sanitation Requirements

Portable potable water supply available on work site? X Yes

Portable toilets required on work site?            Yes If Yes, how many?             
  X   No

Temporary washing/shower facilities required at work site?   X   Yes If Yes, describe below  
       No If No, state location of existing facilities

**Description** Personnel will maintain and use a hand-washing facility at the work site (a tub of soapy water and sprayer or tub of clean rinse water is sufficient) during intrusive field activities, and will wash hands prior to drinking fluids, prior to departing work site, and at any other time personnel may desire to do so or at the instruction of the HSS

An eye wash facility will also be present at the work site, and will consist of, at a minimum, a sufficient number of hand-held bottles of eye wash solution to enable the affected individual to rinse his eyes while enroute to a 15-minute eye-washing station. Many of the buildings near the work areas contain eye washing stations and emergency showers.

Toilets and shower facilities are available in the Field Operations Yard, T891Q. In addition, most buildings within the Industrial Area contain toilets and eye-wash stations, and some contain showers. Before beginning work in a new location, field personnel will contact representatives of the nearest building to acquaint themselves with building facilities. If the building is closed to field personnel, one that is nearby and open to personnel will be located and its facilities will be confirmed.

## 22 Field Procedures Change Authorization

Instruction Number to be changed \_\_\_\_\_ Date \_\_\_\_\_

Duration of Authorization Requested Today only \_\_\_\_\_ Other (describe) \_\_\_\_\_

### Duration of Task

### Description of Procedures Modification

### Justification

**Person requesting change**

Verbal authorization received from

Name \_\_\_\_\_

Name \_\_\_\_\_

Time

**Title**

**Title**

**Signature**

Approved by (Signature of person name above to be  
obtained within 48 hours of verbal authorization)

**THIS PAGE IS TO BE POSTED IN A PROMINENT LOCATION ONSITE**

## 23 Emergency Procedures

Onsite communications required? Yes X No     

**Emergency Channel** Extension 2911 or radio number 2911

**Nearest telephone** Depending on the location of activities, this will be in either Building T891R (for activities in the Buffer Zone to the east/southeast of the base trailer, T891O), Building 792A/PACS 3 (for activities in the Buffer Zone to the northeast), or the nearest building (for activities in the Industrial Area and Protected Area)

## Fire and Explosion

**In the event of a fire or explosion, if the situation can be readily controlled with available resources without jeopardizing the health and safety of yourself, the public, or other site personnel, take immediate action to do so if currently trained. Otherwise**

- 1 Notify emergency personnel by calling 2911
- 2 If possible, isolate the fire to prevent spreading
- 3 Evacuate the area

## Chemical exposure

Site workers must notify the site health and safety officer immediately in the event of any injury or any of the signs or symptoms of overexposure to hazardous substances identified below

### Substances Present

## Solvents, general

### Symptoms of Acute Exposure

Inhalation irritate eyes, skin, respiratory  
Absorption depression, nausea, vomiting  
Ingestion kidney, drowsiness, dizziness  
Consumption incoordination

## First Aid

**Eye Irrigate immediately**  
**Skin wash immediately**  
**Breathing Resp support**  
**Swallow Immediate medical**  
**attention**

**Onsite injury or illness.**

In the event of an injury requiring more than minor first aid, or any employee reporting any sign or symptom of exposure to hazardous substances, immediately take the victim to the RFETS Medical Facility located at Bldg 122 (Figure 3), phone x2594. In the event of life-threatening or traumatic injury, implement appropriate first-aid and immediately call for emergency medical assistance at x2911.

### Designated Personnel Current in First Aid/CPR

Harold Sanchez  
Ray Michael  
Bob Koehler  
Gary Halbersleben

\_\_\_\_\_ Gary Stretesky  
\_\_\_\_\_ Tom Lutherer  
\_\_\_\_\_ Paul Graham  
\_\_\_\_\_ John Boylan

**Figure 3**  
**Location of Medical - Bldg. 122**  
**and Trailer T8910**

**EXPLANATION**

**Standard Map Features**

- ▬ Buildings and other structures
- ▬ Solar evaporation ponds
- ▬ Lakes and ponds
- ▬ Streams, ditches, or other drainage features
- ▬ Fences and other barriers
- ▬ Paved roads
- ▬ Dirt roads

**Notes:**  
 1. This map was prepared using aerial photography taken in 1988.  
 2. The map shows the location of the buildings and trailer T8910 relative to the site boundary.  
 3. The map does not show the location of the medical building relative to the site boundary.



Scale = 1:13510  
 1 inch represents approximately 1128 feet



State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum: NAD83

U.S. Department of Energy  
 Rocky Flats Environmental Technology Site



Rocky Mountain  
 Remediation Services, L.L.C.  
 12345 Main Street  
 Denver, CO 80202

MAP ID: 88-0043

July 27, 1988

**THIS PAGE IS TO BE POSTED IN A PROMINENT LOCATION ONSITE**

**Required Emergency Back-Up Equipment**

Latex or nitrile surgeon gloves

**Emergency Response Authority**

The Shift Superintendent is the designated site emergency coordinator. He has final authority for first response to onsite emergency situations for all individual drilling, probing, and well installation locations. As the HSS, Harold Sanchez will act as the emergency coordinator at project locations until such time as the Shift Super has taken over.

Upon arrival of the appropriate emergency response personnel, the site emergency coordinator will defer all authority but remain on the scene, if necessary, to provide assistance. At the earliest opportunity, the site safety officer or the site emergency coordinator will contact the project coordinator or health and safety officer.

Project Manager Steve Singer (SS)/Rob Smith (RS) Phone (w) SS 3387, RS 7898 (p) SS 212-6255 (r) 3708

Health and Safety Supervisor Dave Farler Phone (w) 4340 (p) 212-6555 (r) 3743

Health and Safety Specialist Harold Sanchez Phone (w) 4953 (r) 3754

**Emergency Contact Telephone and Pager Numbers**

Fire	x2911	Poison Center	629-1123
Ambulance	x2911	Security	x2911

**NEAREST EMERGENCY MEDICAL SERVICES ARE LOCATED IN BUILDING 122 (see Figure 3)**

**Additional Project Telephone(x), Pager (p) or Radio (r) Numbers**

Vice President – Martin Wheeler	x4878/p212-6484
ER Projects Manager – Annette Primrose	x4385/p212-6338/r3801
Program Manager – Steve Singer	x3387/p212-6255/r3708
Project Manager – Rob Smith	x7898/p212-5653/r3708
Field Supervisor – John Boylan	x5182/r3783
H&S Manager – Ken Jenkins	x5374/p212-5693/r4505
Radiological Engineer – John Titus	x5825/p212-2852
HAZMAT Emergency Response	x2911/r2911
RFETS Shift Supervisor	x2914/r3301
Occupational Health General Information	x2594

## 24 Safety Briefing

The following personnel were present at the pre-job safety briefing conducted at \_\_\_\_\_ (time) on \_\_\_\_\_ (date) at \_\_\_\_\_ (location), and have read the above plan and are familiar with its provisions

[illegible]

**Fully charged ABC class fire extinguisher available onsite?**

Yes \_\_\_\_\_

**All project personnel advised of location of nearest phone?**

**Yes** \_\_\_\_\_

**All project personnel advised of location of designated medical facility?**

**Yes** \_\_\_\_\_

Printed name of field team leader or site safety officer

**Signature**

Date \_\_\_\_\_

## Appendix A

# Activity Hazard Analysis for the Task-Specific Health and Safety Plan for FY99 WARP

**ACTIVITY DESCRIPTION** Drilling (using a drill rig) or probing (using a Geoprobe®) soil borings, handling soils, and installing groundwater monitoring wells

Potential Hazards	Required Controls
Slips, trips, and falls	<ul style="list-style-type: none"> <li>Pre-activity work area survey to identify potential hazards associated with operations</li> <li>Secure area, use safety glasses and above-the-ankle hard-toed boots</li> <li>Hazard assessment per the task-specific HASP</li> </ul>
Exposure to airborne radioactive or chemical contaminants	<ul style="list-style-type: none"> <li>On-site monitoring requirements will be established prior to project implementation per Section 7.0* the task-specific HASP, and job-specific RWP</li> </ul>
Dermal exposure with radioactive or chemical contaminants in soils and groundwater	<ul style="list-style-type: none"> <li>Establish monitoring program prior to operations per ALARA Job Review</li> <li>Define appropriate level of PPE per task-specific HASP and RWP</li> </ul>
Mechanical/hydraulic hazards	<ul style="list-style-type: none"> <li>Pre-work safety discussion and procedures identified in the task-specific HASP</li> </ul>
Maintenance/examination of drill rig components above six feet above ground	<ul style="list-style-type: none"> <li>Requires full-body harness, supplied by drilling firm, attached to secure component on rig</li> </ul>
Equipment fatigue and/or malfunction	<ul style="list-style-type: none"> <li>Only qualified operators shall operate drilling and probing equipment</li> <li>Drill rig and Geoprobe® operators will perform daily inspection of equipment in accordance with operating instructions</li> <li>Drill rig operator will complete Operators Daily Inspection Checklist (OS&amp;IH PM 11-14)</li> <li>Detection of potential equipment problems will be documented and reported to field supervisor</li> </ul>
Pinching hazards	<ul style="list-style-type: none"> <li>Pre-work safety discussion and procedures identified in the task-specific HASP</li> <li>Leather gloves per HSS</li> </ul>
Loose clothing and/or PPE worn in vicinity of rotating augers	<ul style="list-style-type: none"> <li>Will be taped and secured to prevent it being caught in moving parts</li> </ul>
Cutting plastic core liners used with Geoprobe®	<ul style="list-style-type: none"> <li>Leather work gloves will be required when cutting core liners</li> <li>Cutting motions will always be directed away from person performing this task (and away from other personnel)</li> <li>Appropriate equipment will be used to cut liners in a firm controlled manner</li> <li>Dull blades and damaged equipment will be replaced</li> <li>Care will be taken to prevent core from being dislodged from core liner during this activity</li> </ul>
Noise exposure	<ul style="list-style-type: none"> <li>Hearing protection will be required during drilling and Geoprobe® hammer operations</li> <li>Noise generation will pause any time a member of the general public is close enough to activities to be exposed to noise &gt;85db (e.g., when probing in Industrial Area)</li> </ul>
Electrical hazards	<ul style="list-style-type: none"> <li>Electrical hazards will be prevented per the Section 6.14* and by performing the required utility locate prior to breaking ground</li> </ul>
Vehicular and pedestrian traffic	<ul style="list-style-type: none"> <li>Site control will be maintained per Section 6.0*</li> </ul>
Underground/above-ground utilities	<ul style="list-style-type: none"> <li>Utility clearances will be performed per the Soil Disturbance Permit</li> </ul>



Potential Hazards	Required Controls
Manual material lifting	<ul style="list-style-type: none"> <li>Personnel will follow safe lifting practices per Section 6 2 9*</li> </ul>
Thunderstorms and lightning	<ul style="list-style-type: none"> <li>Per Sections 6 12* and 8 4 6*</li> </ul>
Falling objects	<ul style="list-style-type: none"> <li>Hard hats, above-the-ankle hard-toed boots, and safety glasses will be worn per Section 7 0* and per the task-specific HASP</li> </ul>
Biological Hazards	<ul style="list-style-type: none"> <li>Pre-work discussion to ensure awareness</li> </ul>
Cold stress/heat stress	<ul style="list-style-type: none"> <li>Pre-work discussion to ensure awareness</li> <li>Follow guidance in Section 6 9* and Section 8 4*</li> </ul>
Contact with potentially contaminated rinse water	<ul style="list-style-type: none"> <li>Personnel PPE will be examined and, if necessary, replaced prior to decon operations (Section 7 0*)</li> </ul>
Similar exposure hazards as identified above	<ul style="list-style-type: none"> <li>PPE and monitoring requirements consistent with intrusive and sampling operations</li> </ul>
High pressure steaming, as appropriate	<ul style="list-style-type: none"> <li>PPE as described in Section 7 0*</li> </ul>

\* refers to the appropriate section in the Groundwater Monitoring Program HASP, RF/ER-SAF-94-GMP, Rev 1

## ISMS Walkdown

## Comments

[illegible]

## Appendix B

The following analytes have been reported in the referenced areas at levels below Tier 2. Analytes that are of no concern (aluminum, calcium, chloride, iron, magnesium, manganese, potassium, silica, silicon, sodium, sulfate, sulfide) because they are common constituents in groundwater and given the planned activities and their innocuous nature are not included. Others that might be grouped with these, such as copper, have been included to be conservative.

Project or Area	Analyte		
903 Pad/Ryan's Pit Plume	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethene 2-Butanone Acetone Americium-241 Ammonia Antimony Arsenic Barium Bromodichloromethane Cesium-137 Chloroform	Chromium cis-1,2-Dichloroethene Copper Fluoride Gross alpha Gross beta Lead Lithium Molybdenum Nickel Orthophosphate Phosphorus Plutonium-238	Plutonium-239/240 Radium-226 Radium-228 Selenium Silver Strontium Strontium-89/90 Tin Toluene Total xylenes Uranium-235 Vanadium Zinc
Actinide wells (903 Pad and Industrial Area)	1,1,1-Trichloroethane 1,2-Dichloroethane 2-Butanone 2-Chloroethyl vinyl ether Acetone Americium-241 Arsenic Barium Beryllium Bis(2-ethylhexyl)phthalate Cesium-137	Chromium Cobalt Copper Di-n-butyl phthalate Gross alpha Gross beta Lead Lithium Mercury Molybdenum Nickel	Plutonium-239/240 Radium-226 Radium-228 Strontium Strontium-89/90 Styrene Tetrachloroethene Toluene Total xylenes Vanadium Zinc
Solar Pond Plume	Acetone Americium-241 Ammonia Arsenic Barium Beryllium Bromofluorobenzene Cadmium Carbon disulfide Carbon tetrachloride Cesium-137 Chloroform Chromium cis-1,2-Dichloroethene Cobalt	Copper Fluoride Gross alpha Gross beta Hexachlorobutadiene Lead Lithium Mercury Methylene chloride Molybdenum Naphthalene Nitrate/nitrite Orthophosphate Phosphorus Plutonium-238	Plutonium-239/240 Radium-226 Radium-228 Silver Strontium Strontium-89/90 Strontium-90 Tetrachloroethene Tin Toluene Total radiocesium Tritium Uranium-235 Vanadium Zinc
East IA Plume	1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,2,3-Trichlorobenzene 1,2,4,5-Tetramethylbenzene 1,2,4-Trichlorobenzene 1,2-Dichloroethane 1,2-Dichloroethene 2-(2-Ethoxyethoxy)ethanol 2-Butanone 2-n-Butoxyethanol 2-Pentanone 4-hydroxy-4-methyl Acetamide, 2-fluoro Acetone Americium-241 Ammonia Arsenic Benzene Benzoic acid Bromacil	Bromodichloromethane Cadmium Cesium Cesium-134 Cesium-137 Chlorobenzene Chloroform Chloromethane Cobalt Copper Curium-244 Cyanide Di-n-butyl phthalate Dichlorodifluoromethane Diethyl phthalate Diethyl adipate Ethylbenzene Fluoride Gross alpha Gross beta	Hexanedioate, mono(2-ethylhexyl) Lead Lithium Mercury Molybdenum n-Butylbenzene Naphthalene Nickel Nitrate/nitrite Orthophosphate Phosphorus Plutonium-238 Plutonium-239/240 Selenium Silver Strontium Tin Toluene Total radiocesium Zinc

Project or Area	Analyte		
Building 444	1,1,1-Trichloroethane 1,1,2-Trichlorotrifluoroethane 1,1-Dichloroethane 1,1-Dichloroethene 1,1-Oxybis(2-ethoxy)ethane 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 2-Cyclohexen-1-ol Acetone Americium-241 Ammonia Antimony Arsenic Barium Benzene Bromodichloromethane Cadmium Carbon disulfide	Carbon tetrachloride Cesium Cesium-134 Cesium-137 Chlorobenzene Chloroform Chloromethane Chromium cis-1,2-Dichloroethene Cobalt Copper Cyanide Di-n-butyl phthalate Dichlorodifluoromethane Diethyl adipate Fluoride Gross alpha Gross beta Hexachlorobutadiene Lead Lithium	Mercury Molybdenum n-Hexane Naphthalene Nickel Orthophosphate Phosphorus Plutonium-238 Plutonium-239/240 Radium-226 Radium-228 Selenium Silver Strontium Tin Total radiocesium Tritium Uranium-235 Vanadium Zinc
Building 771	1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethene 1,2-Dichloropropane 1,3,6-Trioxocane Acetone Americium-241 Ammonia Arsenic Barium Bromomethane Cadmium Cesium Cesium-134 Chlorobenzene	Chromium cis-1,2-Dichloroethene Cobalt Copper Ethane, 1,2-dichloro-1,1,2-Trifluoro Fluoride Gross alpha Gross beta Lead Lithium Mercury Molybdenum Naphthalene Nickel Orthophosphate Phosphorus Plutonium-238	Plutonium-239/240 Radium-226 Radium-228 Selenium Silver Strontium Strontium-89,90 Tetrachloroethene Tin Toluene Total radiocesium Total xylenes trans-1,2-Dichloroethene Uranium-235 Vanadium Zinc
Building 886	1,2-Dichloroethane Acetone Americium-241 Arsenic Barium Cadmium Carbon disulfide Chloroform Chromium Cobalt Copper	Fluoride Gross alpha Gross beta Lead Lithium Methylene chloride Molybdenum Nickel Nitrate/nitrite Plutonium-238 Plutonium-239/240	Radium-226 Radium-228 Selenium Strontium Strontium-89,90 Tetrachloroethene Tin Trichloroethene Tritium Vanadium Zinc